

SWITCHING REGURATOR APPLICATIONS

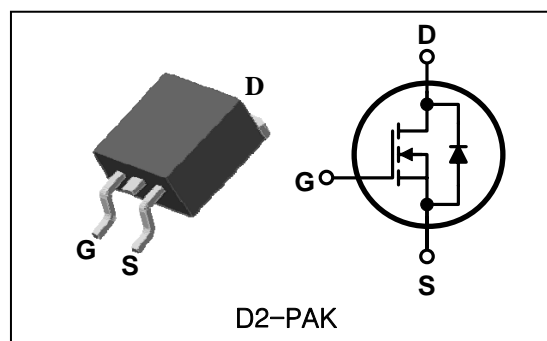
Features

- High Voltage : $BV_{DSS}=600V(\text{Min.})$
- Low C_{RSS} : $C_{RSS}=18pF(\text{Typ.})$
- Low gate charge : $Qg=35nC(\text{Typ.})$
- Low $R_{DS(on)}$: $R_{DS(on)}=0.75\Omega(\text{Max.})$

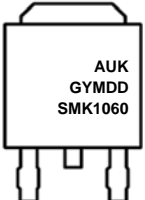
Ordering Information

| Type No. | Marking | Package Code |
|-----------|---------|--------------|
| SMK1060D2 | SMK1060 | D2-PAK |

PIN Connection



Marking Diagram

| | |
|--|---|
|  | Column 1 : Manufacturer |
| | Column 2 : Production Information e.g.) GYMDD |
| | - . G : Factory management code - . YMDD : Date Code (year, month, date) |
| | Column 3 : Device Code |

Absolute maximum ratings ($T_C=25^\circ\text{C}$ unless otherwise noted)

| Characteristic | Symbol | Rating | Unit | |
|----------------------------------|-----------|-------------------------|------------------|---|
| Drain-source voltage | V_{DSS} | 600 | V | |
| Gate-source voltage | V_{GSS} | ± 30 | V | |
| Drain current (DC) * | I_D | $T_C=25^\circ\text{C}$ | 10 | A |
| | | $T_C=100^\circ\text{C}$ | 6.32 | A |
| Drain current (Pulsed) * | I_{DM} | 40 | A | |
| Power dissipation | P_D | 130 | W | |
| Avalanche current (Single) ② | I_{AS} | 10 | A | |
| Single pulsed avalanche energy ② | E_{AS} | 490 | mJ | |
| Avalanche current (Repetitive) ① | I_{AR} | 10 | A | |
| Repetitive avalanche energy ① | E_{AR} | 11.6 | mJ | |
| Junction temperature | T_J | 150 | $^\circ\text{C}$ | |
| Storage temperature range | T_{stg} | -55~150 | | |

* Limited by maximum junction temperature

| Characteristic | Symbol | Typ. | Max. | Unit |
|--------------------|------------------|------|------|---------------------------|
| Thermal resistance | Junction-case | - | 0.96 | $^\circ\text{C}/\text{W}$ |
| | Junction-ambient | - | 62.5 | |

Electrical Characteristics (T_C=25°C unless otherwise noted)

| Characteristic | Symbol | Test Condition | Min. | Typ. | Max. | Unit | |
|--------------------------------|---------------------|--|------|------|------|------|---|
| Drain-source breakdown voltage | BV _{DSS} | I _D =250μA, V _{GS} =0V | 600 | - | - | V | |
| Gate threshold voltage | V _{GS(th)} | I _D =250μA, V _{DS} =V _{GS} | 2.0 | - | 4.0 | V | |
| Drain-source cut-off current | I _{DSS} | V _{DS} =600V, V _{GS} =0V | - | - | 1 | μA | |
| Gate leakage current | I _{GSS} | V _{DS} =0V, V _{GS} =±30V | - | - | ±100 | nA | |
| Drain-source on-resistance ④ | R _{DS(on)} | V _{GS} =10V, I _D =5.0A | - | 0.60 | 0.75 | Ω | |
| Forward transfer conductance ④ | g _{fs} | V _{DS} =10V, I _D =5.0A | - | 8.0 | - | S | |
| Input capacitance | C _{iss} | V _{GS} =0V, V _{DS} =25V f=1 MHz | - | 2000 | 2350 | pF | |
| Output capacitance | C _{oss} | | - | 160 | 215 | | |
| Reverse transfer capacitance | C _{rss} | | - | 18 | - | | |
| Turn-on delay time | t _{d(on)} | V _{DD} =300V, I _D =10A R _G =25Ω | - | 23 | - | ns | |
| Rise time | t _r | | - | 69 | - | | |
| Turn-off delay time | t _{d(off)} | | ③④ | - | 144 | | - |
| Fall time | t _f | | - | 77 | - | | |
| Total gate charge | Q _g | V _{DS} =480V, V _{GS} =10V I _D =10A | - | 35 | 57 | nC | |
| Gate-source charge | Q _{gs} | | ③④ | - | 9.0 | | - |
| Gate-drain charge | Q _{gd} | | - | 10 | - | | |

Source-Drain Diode Ratings and Characteristics (T_C=25°C unless otherwise noted)

| Characteristic | Symbol | Test Condition | Min. | Typ. | Max. | Unit |
|---------------------------|-----------------|---|------|------|------|------|
| Source current (DC) | I _S | Integral reverse diode in the MOSFET | - | - | 10 | A |
| Source current (Pulsed) ① | I _{SM} | | - | - | 40 | |
| Forward voltage ④ | V _{SD} | V _{GS} =0V, I _S =10A | - | - | 1.4 | V |
| Reverse recovery time | t _{rr} | I _S =10A, V _{GS} =0V dI _F /dt=100A/μs | - | 470 | - | ns |
| Reverse recovery charge | Q _{rr} | | - | 6 | - | μC |

Note ;

- ① Repetitive rating : Pulse width limited by maximum junction temperature
- ② L=10mH, I_{AS}=9.5A, V_{DD}=50V, R_G=25Ω, Starting T_J=25°C
- ③ Pulse Test : Pulse width≤300μs, Duty cycle≤2%
- ④ Essentially independent of operating temperature

Electrical Characteristic Curves

Fig. 1 $I_D - V_{DS}$

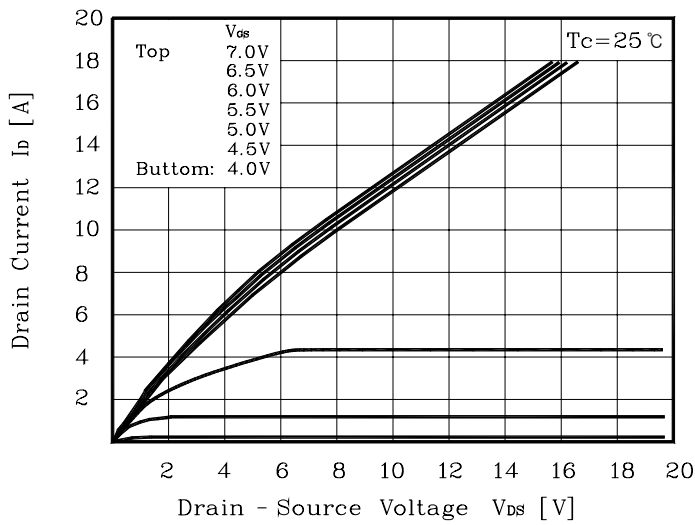


Fig. 2 $I_D - V_{GS}$

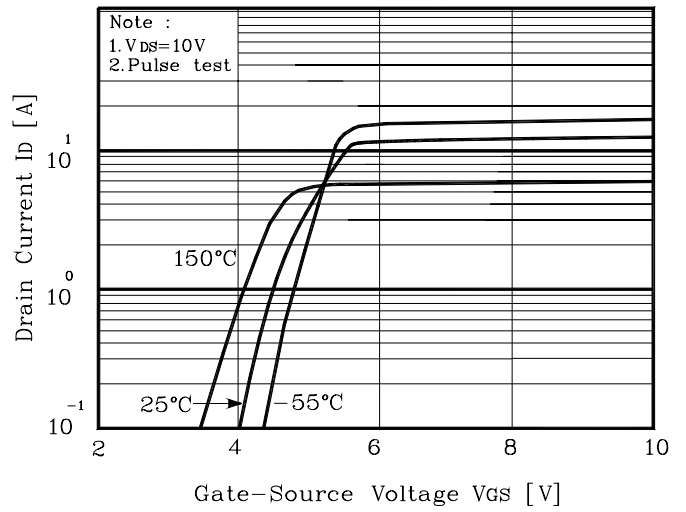


Fig. 3 $R_{DS(on)} - I_D$

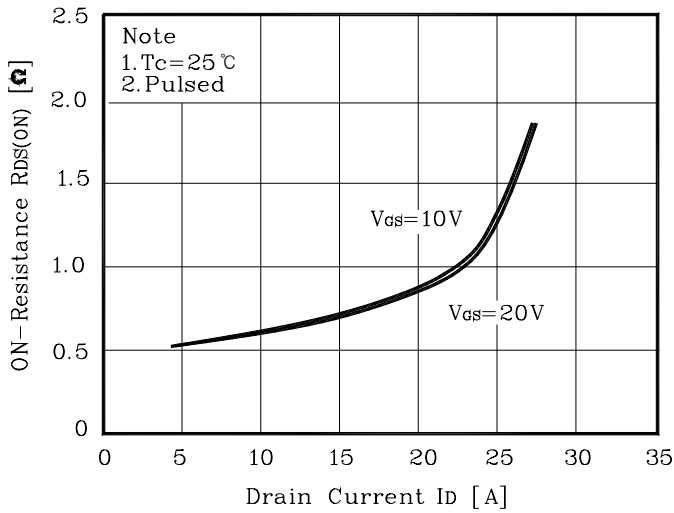


Fig. 4 $I_S - V_{SD}$

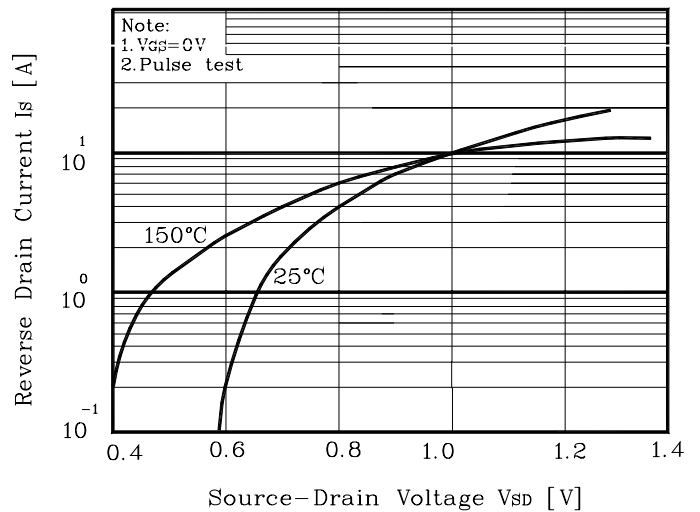


Fig. 5 Capacitance - V_{DS}

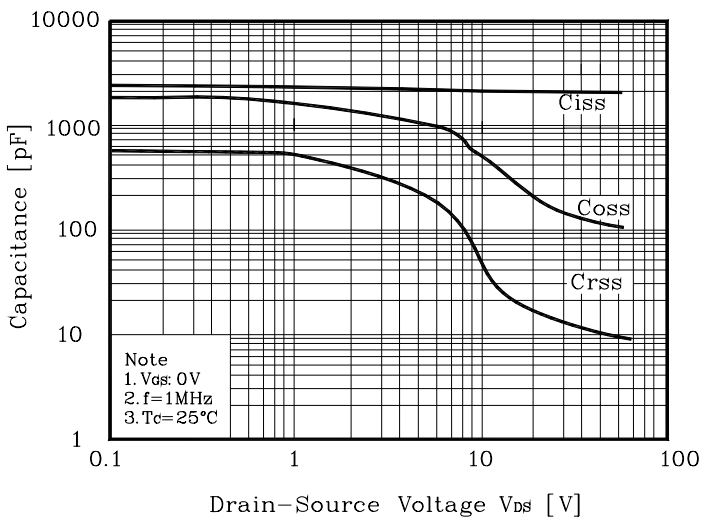
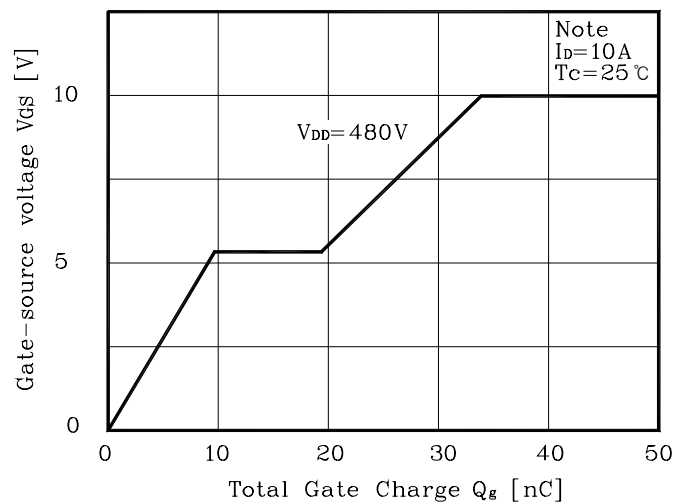


Fig. 6 $V_{GS} - Q_g$



Electrical Characteristic Curves

Fig. 7 $V_{DSS} - T_J$

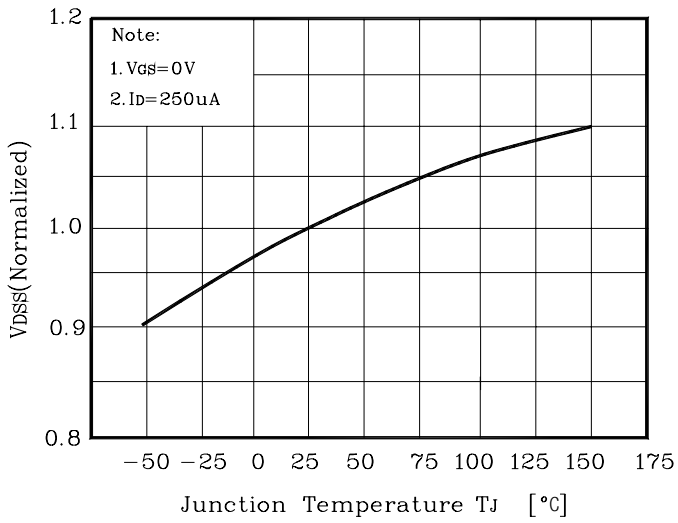


Fig. 8 $R_{DS(on)} - T_J$

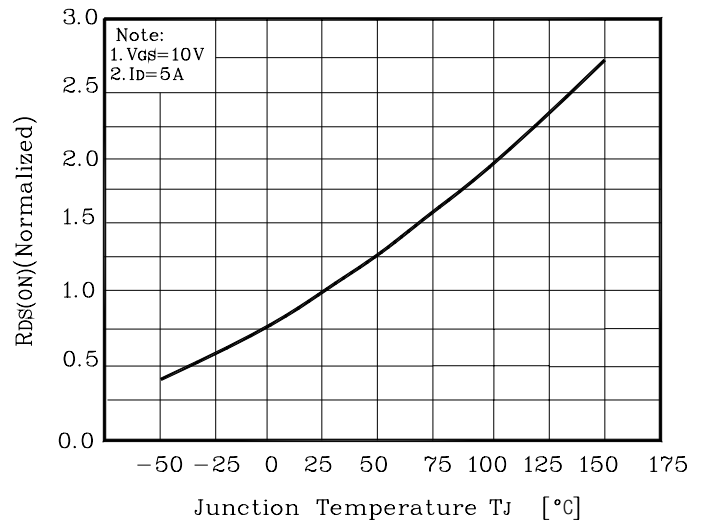


Fig. 9 $I_D - T_C$

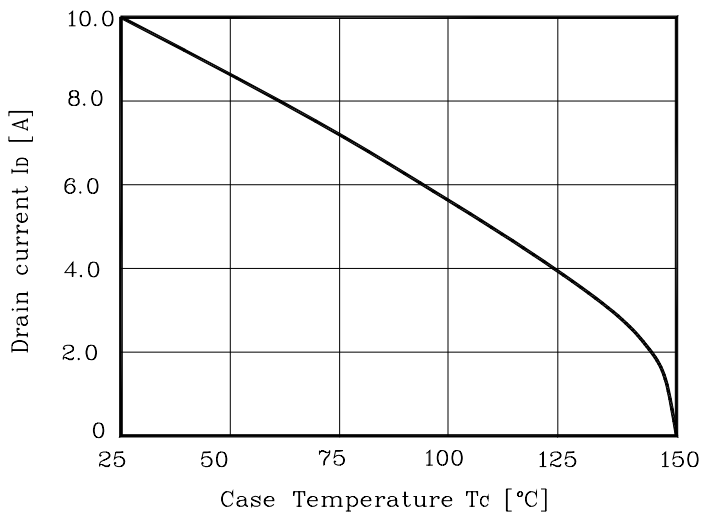


Fig. 10 Safe Operating Area

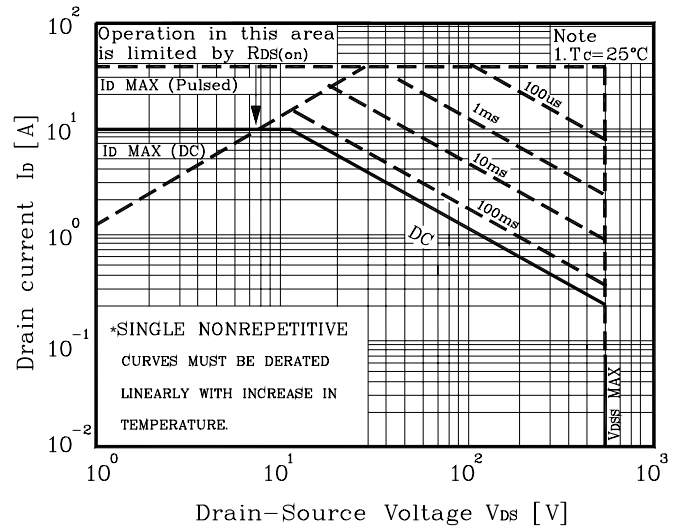


Fig. 11 Gate Charge Test Circuit & Waveform

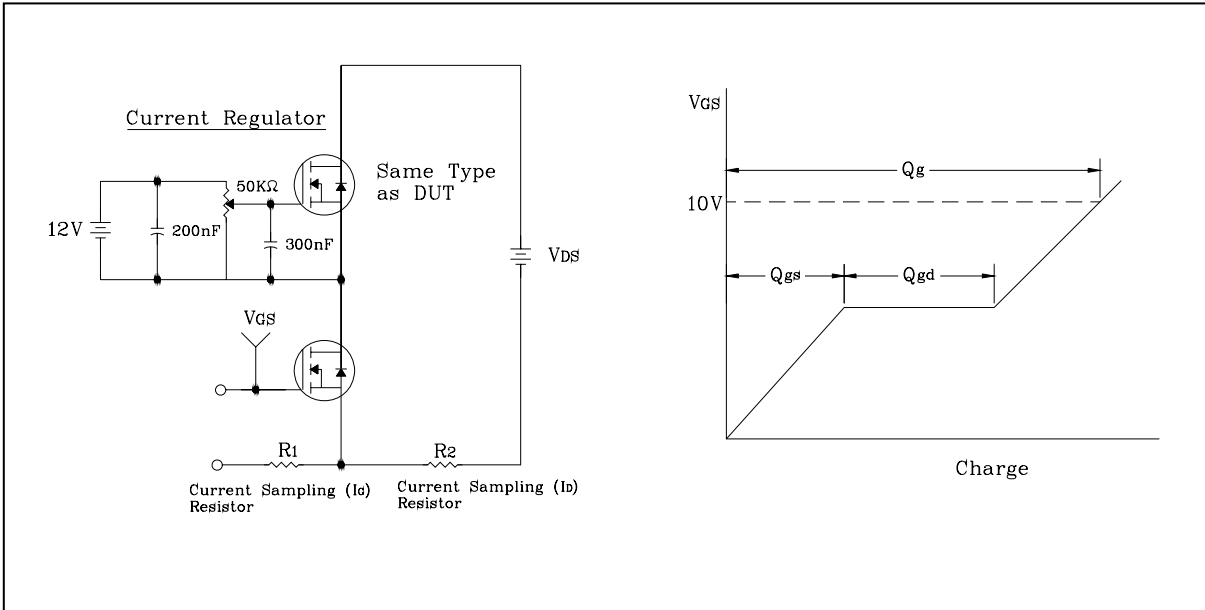


Fig. 12 Resistive Switching Test Circuit & Waveform

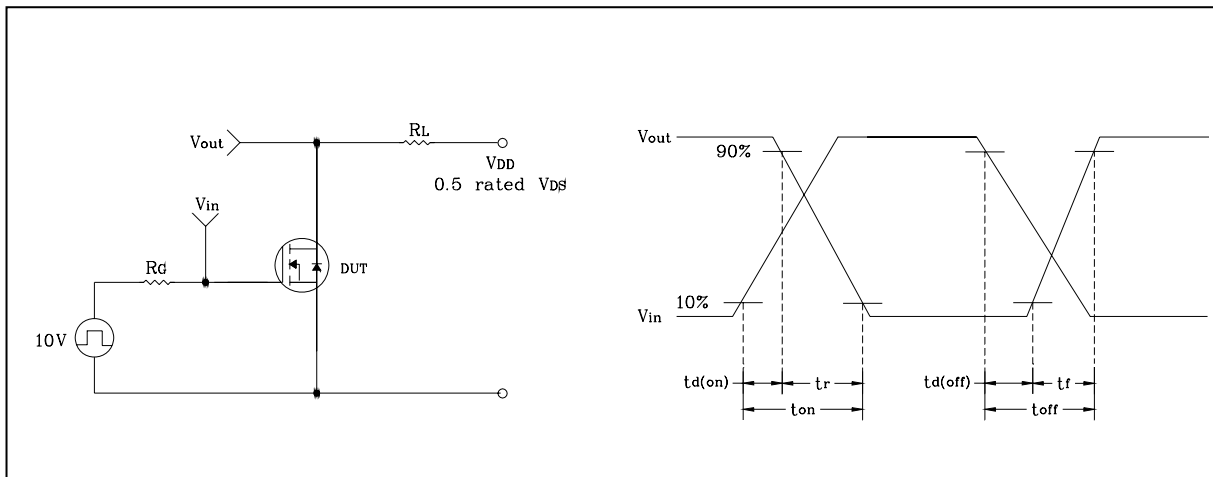


Fig. 13 E_{AS} Test Circuit & Waveform

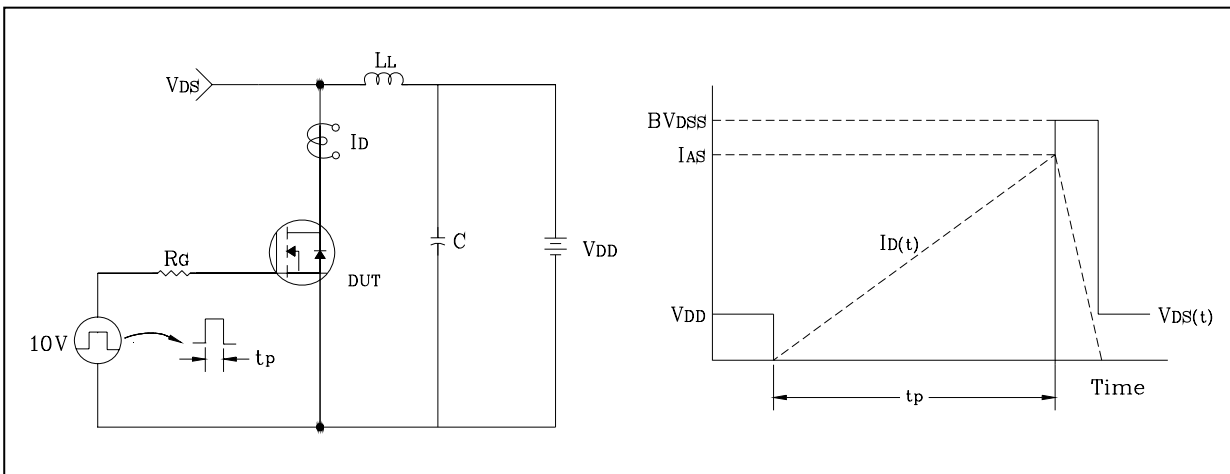
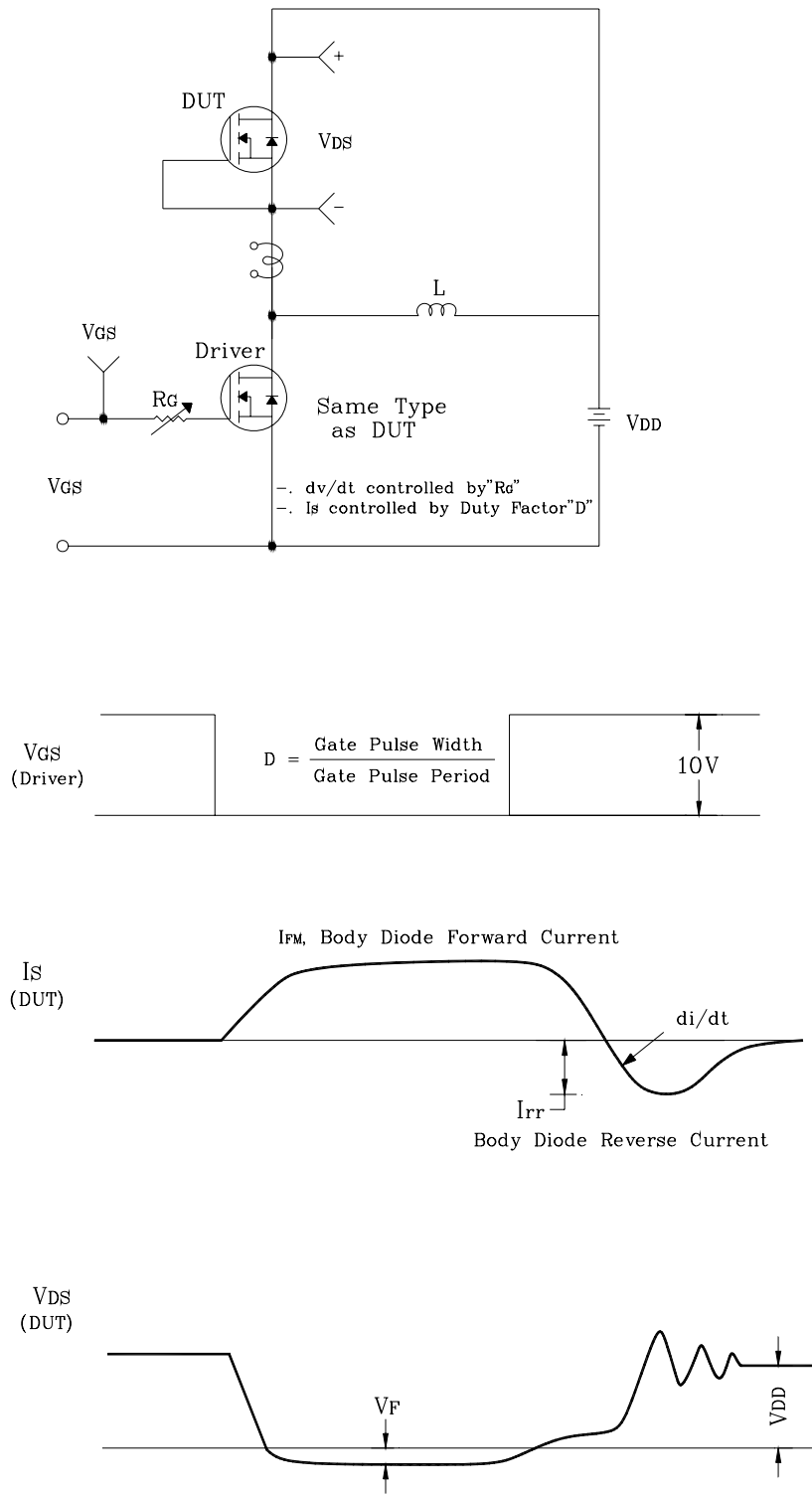
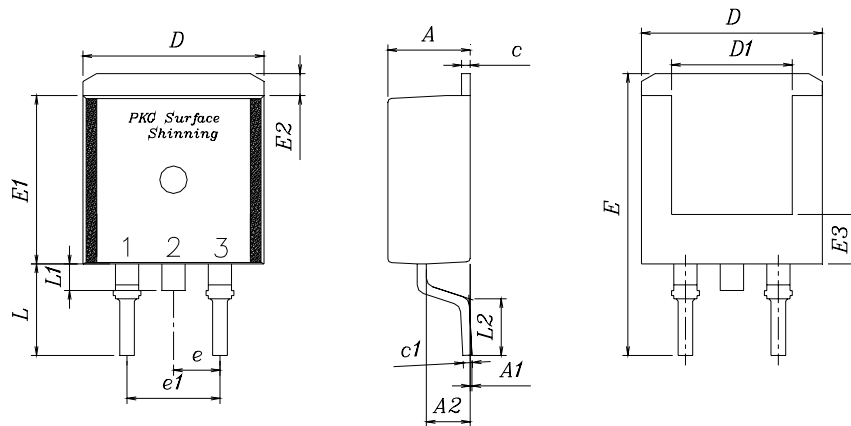


Fig. 14 Diode Reverse Recovery Time Test Circuit & Waveform



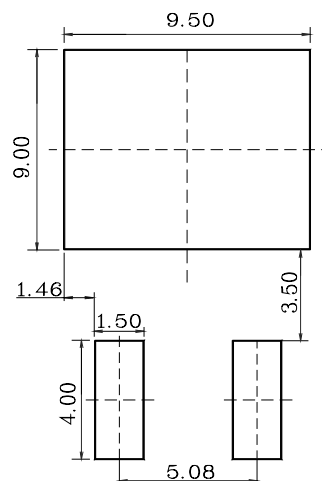
Outline Dimension

unit: mm



| SYMBOL | MILLIMETERS | | | NOTE |
|--------|-------------|---------|---------|------|
| | MINIMUM | NOMINAL | MAXIMUM | |
| A | 4.35 | 4.50 | 4.65 | |
| A1 | — | — | 0.15 | |
| A2 | 2.20 | 2.40 | 2.60 | |
| c | 0.40 | 0.50 | 0.60 | |
| c1 | 0.40 | 0.50 | 0.60 | |
| D | 9.80 | 10.00 | 10.20 | |
| D1 | 6.40 | 6.60 | 6.80 | |
| E | 15.00 | 15.40 | 15.80 | |
| E1 | 9.05 | 9.20 | 9.35 | |
| E2 | 1.00 | 1.20 | 1.40 | |
| E3 | 2.50 | 2.70 | 2.90 | |
| e | 2.34 | 2.54 | 2.74 | |
| e1 | 4.88 | 5.08 | 5.28 | |
| L | 4.60 | 5.00 | 5.40 | |
| L1 | 1.40 | 1.45 | 1.50 | |
| L2 | 2.50 | — | — | |

※ Recommended Land Pattern [unit: mm]



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